

Importance of the Analysis of Seafloor Morphology in the Investigation of Deepwater Basins

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As a routine part of the evaluation of deepwater geohazards, a thorough assessment of seafloor morphology is conducted by processing and carefully displaying the waterbottom event from regional-scale 3D seismic surveys. Analysis of numerous surveys in the Gulf of Mexico and over 20 large surveys in producing and frontier basins on three other continents reveals a myriad of geomorphic details over a wide range of geologic settings. These details are frequently unexpected and sometimes remain unexplained, even after careful investigation.

An unintended result from the study of deepwater seafloor morphology is at least three general observations. First, many deepwater settings are dominated by large mass movement deposits, termed mass-transport complexes (MTCs). The characteristics of MTCs are their extreme variation in size and equally variable length, width, and thickness dimensions. Second, channel complexes that cross the seafloor are also highly variable and complex. The features that are preserved on the seafloor appear to be the result of processes that involve components of lateral migration, aggradation, and local channel margin failure. Third, the degree of expulsion observed on the seafloor appears to have little correlation with deeper hydrocarbon potential or near-surface pressure regime.

Even though the primary reason to conduct an analysis of seafloor morphology in deepwater environments is avoidance of geohazards, other beneficial results routinely occur. Those included a hint to the nature of the near-surface depositional process (i.e., confined vs. unconfined deposition) and to the dominant structural style. Frequently, these near-surface indicators serve as shallow analogs that help explain sedimentary and structural components of the deeper, prospective level.
